R E P O R T R E S U M E S

ED 003 537 56

MAGNETIC RECORDINGS AND VISUAL DISPLAYS AS AIDS IN TEACHING INTRODUCTORY PSYCHOLOGY TO COLLEGE STUDENTS.

BY- JOHNSTON, ROLAND E., JR.
DREXEL INST. OF TECHNOLOGY, PHILADELPHIA, PA.

REPORT NUMBER NDEA-VIIA-240 PUB DATE MAY 61
GRANT OEG-736056-00
EDRS PRICE MF-$0.18 HC-$2.72 68P.

DESCRIPTORS- *AUDIOVISUAL INSTRUCTION, TEACHER SHORTAGE, STUDENT TEACHER RELATIONSHIP, AUDIOVISUAL AIDS, *TAPE RECORDINGS, COMPARATIVE ANALYSIS, *CONVENTIONAL INSTRUCTION, *PSYCHOLOGY, ACHIEVEMENT, *COLLEGE STUDENTS, PHILADELPHIA, PENNSYLVANIA

THIS PROJECT WAS AN EXPERIMENT TO COMPARE ACHIEVEMENT IN CLASSES TAUGHT WITH AUDIOVISUAL PRESENTATIONS AND DISCUSSION TO ACHIEVEMENT IN CLASSES TAUGHT BY CONVENTIONAL METHODS OF LECTURE, DISCUSSION, AND LABORATORY WORK. SINCE ACHIEVEMENT TENDED TO BE SLIGHTLY HIGHER IN SECTIONS TAUGHT BY CONVENTIONAL METHODS, THE CONTINUATION OF THE CONVENTIONAL METHOD WAS RECOMMENDED. SHOULD A SEVERE TEACHER SHORTAGE DEVELOP, TEACHER-STUDENT CONTACT CAN BE REDUCED BY ONE-HALF IN CLASSES IN GENERAL PSYCHOLOGY WITH ONLY A SMALL DECREASE IN ACHIEVEMENT AS MEASURED BY TESTS. EVALUATION OF STUDENT RESPONSE TO THIS METHOD OF PRESENTATION IS INCONCLUSIVE BECAUSE OF THE POOR QUALITY OF THE RECORDINGS USED AND POOR ACOUSTICS IN THE PRESENTATION ROOM. (LP)

ED003537

240

[redacted]

Magnetic Recordings and Visual Displays as Aids in Teaching Introductory Psychology to College Students

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Office of Education
This document has been reproduced exactly as received from the person or organization originating it. Points of view or opinions stated do not necessarily represent official Office of Education position or policy.

DREXEL INSTITUTE of TECHNOLOGY

May 31, 1961

OE Grant No. 736056.00

DREXEL INSTITUTE OF TECHNOLOGY

Principal Investigator: Poland E. Johnston, Jr.

MAGNETIC RECORDINGS AND VISUAL DISPLAYS AS AIDS IN TEACHING INTRODUCTORY PSYCHOLOGY TO COLLEGE STUDENTS

Philadelphia 4, Pennsylvania

May, 1961

The research reported herein was supported by a grant from the United States Office of Education, Department of Health, Education, and Welfare.

CONTENTS

Chapter		Page
I	THE TAPE RECORDER IN TEACHING	1
II	THE PROBLEM OF THIS STUDY	3
III	PROCEDURE	4
	Teaching Procedures	4
	Method	7
IV	RESULTS	13
	Test Reliability	13
	Achievement in Control and Experimental Groups	14
	Student Acceptance of the Experimental Method.	30
	Voluntary Listening to Tape Recorded Lectures.	48
V	CONCLUSIONS AND RECOMMENDATIONS	50
	Conclusions	50
	Recommendations.	50
BIBLIOGRAPHY		55
APPENDIX A		57
APPENDIX B		61

TABLES

Table		Page
I	ASSIGNMENTS OF INSTRUCTORS EACH QUARTER TO SECTIONS IN VARIOUS COLLEGES	9
II	DATA ON THE ODD-EVEN RELIABILITY OF THE TESTS ON GENERAL PSYCHOLOGY	14
III	INTERCORRELATIONS OF EIGHT INDEPENDENT VARIABLES AND CRITERION OF ACHIEVEMENT BASED ON 211 STUDENTS WITH ACTUAL SAT-V SCORES	17
IV	ANALYSIS OF VARIANCE BASED ON PREDICTED ACHIEVEMENT SCORES FOR 211 STUDENTS WITH ACTUAL SAT-V SCORES . .	19
V	MEANS AND STANDARD DEVIATIONS OF PREDICTED ACHIEVEMENT SCORES FOR CONTROL, EXPERIMENTAL, AND TOTALS FOR CONTROL AND EXPERIMENTAL GROUPS, SAT-V SCORE ACTUAL	20
VI	INTERCORRELATIONS OF EIGHT INDEPENDENT VARIABLES AND CRITERION OF ACHIEVEMENT BASED ON 186 STUDENTS WITH ESTIMATED SAT-V SCORES	21
VII	ANALYSIS OF VARIANCE BASED ON PREDICTED ACHIEVEMENT SCORES FOR 186 STUDENTS WITH ESTIMATED SAT-V SCORES	22
VIII	MEANS AND STANDARD DEVIATIONS OF PREDICTED ACHIEVEMENT SCORES FOR CONTROL, EXPERIMENTAL, AND TOTALS FOR CONTROL AND ESPERIMENTAL GROUPS, SAT-V SCORE ESTIMATED	23
IX	COMPARISONS OF ACHIEVEMENT OF MALES IN CONTROL SECTIONS TO MALES IN EXPERIMENTAL SECTIONS, AND OF FEMALES IN CONTROL SECTIONS TO FEMALES IN EXPERIMENTAL SECTIONS	26
X	COMPARISON OF ACHIEVEMENT OF STUDENTS IN THE COLLEGE OF BUSINESS ADMINISTRATION IN CONTROL SECTIONS TO THAT OF SUCH STUDENTS IN EXPERIMENTAL SECTIONS	27

TABLES

Table		Page
I	ASSIGNMENTS OF INSTRUCTORS EACH QUARTER TO SECTIONS IN VARIOUS COLLEGES	9
II	DATA ON THE ODD-EVEN RELIABILITY OF THE TESTS ON GENERAL PSYCHOLOGY	14
III	INTERCORRELATIONS OF EIGHT INDEPENDENT VARIABLES AND CRITERION OF ACHIEVEMENT BASED ON 211 STUDENTS WITH ACTUAL SAT-V SCORES	17
IV	ANALYSIS OF VARIANCE BASED ON PREDICTED ACHIEVEMENT SCORES FOR 211 STUDENTS WITH ACTUAL SAT-V SCORES . .	19
V	MEANS AND STANDARD DEVIATIONS OF PREDICTED ACHIEVEMENT SCORES FOR CONTROL, EXPERIMENTAL, AND TOTALS FOR CONTROL AND EXPERIMENTAL GROUPS, SAT-V SCORE ACTUAL	20
VI	INTERCORRELATIONS OF EIGHT INDEPENDENT VARIABLES AND CRITERION OF ACHIEVEMENT BASED ON 186 STUDENTS WITH ESTIMATED SAT-V SCORES	21
VII	ANALYSIS OF VARIANCE BASED ON PREDICTED ACHIEVEMENT SCORES FOR 186 STUDENTS WITH ESTIMATED SAT-V SCORES	22
VIII	MEANS AND STANDARD DEVIATIONS OF PREDICTED ACHIEVEMENT SCORES FOR CONTROL, EXPERIMENTAL, AND TOTALS FOR CONTROL AND EXPERIMENTAL GROUPS, SAT-V SCORE ESTIMATED	23
IX	COMPARISONS OF ACHIEVEMENT OF MALES IN CONTROL SECTIONS TO MALES IN EXPERIMENTAL SECTIONS, AND OF FEMALES IN CONTROL SECTIONS TO FEMALES IN EXPERIMENTAL SECTIONS	26
X	COMPARISON OF ACHIEVEMENT OF STUDENTS IN THE COLLEGE OF BUSINESS ADMINISTRATION IN CONTROL SECTIONS TO THAT OF SUCH STUDENTS IN EXPERIMENTAL SECTIONS	27

Table		Page
XI	COMPARISON OF ACHIEVEMENT OF STUDENTS IN THE COLLEGE OF ENGINEERING IN CONTROL SECTIONS TO THAT OF SUCH STUDENTS IN EXPERIMENTAL SECTIONS . . .	28
XII	COMPARISON OF ACHIEVEMENT OF STUDENTS IN THE COLLEGE OF HOME ECONOMICS IN CONTROL SECTIONS TO THAT OF SUCH STUDENTS IN EXPERIMENTAL SECTIONS . . .	28
XIII	COMPARISON OF ACHIEVEMENT OF STUDENTS IN CONTROL SECTIONS TO THAT OF STUDENTS IN EXPERIMENTAL SECTIONS WHEN STUDENTS ARE SEGREGATED BY COURSE PURSUED	29
XIV	STUDENT ESTIMATES OF LEARNING THROUGH TAPE RECORDED LECTURES AND DISCUSSION COMPARED TO CONVENTIONAL INSTRUCTION	32
XV	STUDENT ESTIMATE OF INTEREST IN COURSE PRESENTED BY TAPE RECORDED LECTURES AND DISCUSSION COMPARED TO CONVENTIONAL INSTRUCTION	32
XVI	STUDENT ESTIMATE OF DEGREE TO WHICH THEY MISSED NOT BEING ABLE TO PARTICIPATE IN CLASS DISCUSSIONS OR TO ASK QUESTIONS DURING LISTENING PERIODS	33
XVII	STUDENT AGREEMENT WITH STATEMENT THAT WHEN LISTENING TO TAPE RECORDED LECTURES AND VIEWING POSTERS THERE ARE FEWER DISTRACTIONS THAN IN CONVENTIONAL INSTRUCTION AND YOU CAN CONCENTRATE BETTER	33
XVIII	STUDENT RESPONSES TO QUESTION "DO YOU FEEL THAT YOU KNOW YOUR INSTRUCTOR IN THE COURSE AS WELL AS YOU KNOW YOUR OTHER INSTRUCTORS WHOM YOU HAVE HAD FOR AN EQUAL TIME?".	35
XIX	STUDENT RESPONSES TO QUESTION "DO YOU FEEL THAT YOU WOULD ENROLL FOR ANOTHER COLLEGE COURSE THAT USED THIS METHOD OF INSTRUCTION?"	35
XX	STUDENT RESPONSES TO QUESTION "DO YOU FEEL THAT THE DISCUSSION WITH YOUR INSTRUCTOR ADDED ANYTHING APPRECIABLE TO YOUR LEARNING IN THE COURSE	36

CHAPTER I

THE TAPE RECORDER IN TEACHING

It is known that the next decade will bring a great increase in the number of college students, along with an increasing demand for instructors on the college level. One possible way that a shortage of instructors might be met would be to make greater use of magnetic recordings accompanied by visual displays or posters. Such recordings and displays could be presented by senior students who are preparing to become secondary school teachers, and this would provide valuable experience for them. The proposed method of presentation would reduce the number of contact hours between the instructor and the classes in General Psychology by one-half. Instructor-student interaction would be maintained through using the audio-visual presentations two periods per week, with discussion led by the instructor two additional periods per week.

Tape recordings have been used with success to teach spelling and Spanish in the seventh grade. 1/ This program was expanded to include teaching a second year of Spanish in the eighth grade and giving timed tests in typing. 2/ It is probable that tape

---

1/ Pickrel, Glenn, Neidt, Charles, and Gibson, Romain, "Tape Recordings Are Used to Teach Seventh Grade Students in Westside Junior-Senior High School, Omaha, Nebraska," Bulletin of the National Association of Secondary School Principals, Vol. 42, No. 234, January, 1958, Pp. 81-93.

2/ Gibson, Mrs. Rodney E., "The Tape Recordings Experiment is Expanded in Westside Junior and Senior High Schools, Omaha, Nebraska," Bulletin of the National Association of Secondary School Principals, Vol. 43, No. 253, January, 1959, Pp. 49-72.

recordings could be employed with success on other levels of instruction.

At the Pennsylvania State University, closed-circuit television has been used to teach General Chemistry, General Psychology, and Psychology of Marriage. 3/ This program was expanded to include many additional college subjects. 4/ While the results were satisfactory, closed-circuit television appears to be feasible only where large numbers of students may be taught simultaneously. Unless video tape recording is employed, television lacks the characteristic of repeatability which is a valuable characteristic of tape recorded sound. With tape recorded materials, it is possible for a student who has been absent from class to hear at a later time what was missed. Students could also use such materials for purpose of review.

The use of the tape recorder in language laboratories is well known.

No attempt has been made to review all of the reported uses of the tape recorder as an aid in education. Those cited do indicate some instances of use.

3/ Carpenter, C. R. & Greenhill, L. P., Project Number One, An Investigation of Closed-Circuit Television for Teaching University Courses. University Park, Pa.: The Pennsylvania State University, 1955.

4/ Carpenter, C. R. & Greenhill, L. P., Report Number Two, An Investigation of Closed-Circuit Television for Teaching University Courses. University Park, Pa.: The Pennsylvania State University, 1958.

CHAPTER II

THE PROBLEM OF THIS STUDY

This project was an experiment to determine how achievement in classes with audio-visual presentations and discussion compared to that in classes taught by conventional methods, namely lectures, discussion, and laboratory work.

Specific objectives were as follows:

1. To compare the achievement of General Psychology students taught through audio-visual presentations and discussion with that of students taught by conventional methods.

2. To determine what factors (e.g., year in college, sex, curriculum being pursued, previous related courses, Scholastic Aptitude Test score, etc.) are related to achievement in the course.

3. To determine whether any of these factors are related to the effectiveness of the method of presentation.

4. To determine how frequently and in what number students who have been absent from class will avail themselves of the opportunity to hear and/or see what they missed.

5. To determine how frequently and in what number students will use the audio-visual materials for the purpose of review.

6. To give senior students who are preparing to become secondary school teachers first-hand experience in operating the tape recorder and handling posters.

CHAPTER III

PROCEDURE

TEACHING PROCEDURES

For both control and experimental sections the course extended over one quarter of twelve weeks duration, which consisted of eleven weeks of classes and one week of final examinations. During each week of classes, there were two single periods (each 53 minutes) and one double period (the laboratory period).

The control sections, taught by conventional methods, and the experimental sections, taught through tape recorded lectures with posters plus discussion, were given the same textbook assignments. 5/ The titles of the chapters assigned will serve to suggest the general nature of the course. The titles were:

The Science of Psychology
Maturation and Development
Motivation
Feeling and Emotion
Learning and Remembering
Imagination and Thinking
Attention and Perception
Psychological Measurement
Personality
Frustration and Conflict
Mental Health and Psychotherapy
Intellectual Abilities
Aptitudes and Vocational Adjustment
Vision
Hearing and Lower Senses
The Brain and Nervous System

5/ Morgan, Clifford T., Introduction to Psychology, New York: McGraw-Hill Book Company, 1956

Control Sections

During each week of classes, the control sections had two single periods of lecture and discussion. The lectures were relatively informal, not necessarily closely related to the material in the textbook, with questions permitted as they might arise. While discussion was encouraged, an attempt was made to keep it relevant to the topic under consideration at the time. Simple laboratory studies were conducted each week of classes during the double periods. The laboratory exercises included the following titles: A Test of Common Knowledge, Free Association, Performance Curves, Factors Influencing Level of Performance, An Evaluation of Personality, and Auditory Space Perception. The students collected data, tabulated them, made statistical analyses, drew conclusions, and wrote reports. Chapters in the textbook relevant to the laboratory exercises were assigned as out-of-class readings.

Experimental Sections

For use in the experimental sections, posters and tape recorded lectures were prepared during the Fall of 1959. Three instructors recorded a total of twenty-two lectures, each lasting approximately fifty minutes. Each instructor recorded approximately one-third of the twenty-two lectures. The time required to record each lecture was about five hours. Each lecture was recorded on a tape 1200 feet in length. Recording speed was 3-3/4 inches per second.

The lecture topics were similar to those of the chapters

assigned in the textbook, and were as follows:

Introduction
Maturation
Motivation
Emotion
Learning - 1
Learning - 2
Thinking
Perception
Measurement
Personality - 1
Personality - 2
Frustration - 1
Frustration - 2
Mental Health
Intelligence - 1
Intelligence - 2
Aptitudes
Vision - 1
Vision - 2
Other Senses
Nervous System - 1
Nervous System - 2

Each instructor recorded lectures on those topics in which he was most proficient or most interested.

As the lectures were planned, designs for the posters were drawn on five inch by eight inch index cards. The posters were made by Drexel students majoring in Art; most of the work was done by one student on a full time basis during one of her periods of cooperative work experience. A few other students worked on the posters on a part-time basis. The posters measured twenty-two by twenty-eight inches, and contained the words, definitions, and diagrams that would have been placed on the blackboard during a live lecture. The total number of posters was 444. The smallest number of posters per lecture was seven; the largest was 60. The mean number of posters per lecture was slightly greater than 20. The posters were executed in black drawing ink on white poster

boards. Colored inks were used when necessary.

In some of the experimental sections, the tape recorder was operated and the posters manipulated by one of several student assistants. Student assistants were not available in all of the experimental sections either because of lack of interest or because the student assistants had classes scheduled at the time that the experimental sections met. When a student assistant was not available, the regular instructor of the section performed the same functions. During the first period of each week, the student assistant (or the instructor) placed the appropriate tape on the tape recorder and prepared it for operation. The posters for the lecture were placed on an easel. After the arrival of the members of the class, attendance was recorded and the recorder was turned on. At the end of the part of the lecture illustrated by the exposed poster, that poster was removed, thus exposing the next poster. During the next period that the class met, there was an informal discussion of the preceding lecture. This alternation of taped lecture and discussion was then repeated. During the double period each week, a recorded lecture was presented during the first period and discussed during the second period. The students in the experimental sections did not perform the laboratory exercises.

METHOD

The teaching of the control and experimental sections occurred during the calendar year 1960, thus extending over four quarters. The students were enrolled in the College of Business Administration,

in the College of Engineering, or in the College of Home Economics. Usually each section contained students from just one of these Colleges; however, occasionally a section contained students from two and rarely from all three of these Colleges. The assignment of students to the sections could not be controlled since this was done by their respective Colleges either on an alphabetical basis, or on the basis of when the student appeared to be registered.

During the period of the study, there were eighteen sections of General Psychology, nine control and nine experimental. Ten sections were from the College of Business Administration, and of these four were control sections and six experimental sections. There were four sections from the College of Engineering, three control and one experimental. From the College of Home Economics there were also four sections, two of them control sections and two experimental sections.

The largest section contained 33 students, the smallest section 12. The median for the control sections was 23; the median for the experimental sections was 21.

At the beginning of each quarter, the sections were designated as control or experimental in order to have the number of control sections equal the number of experimental sections. This was not attained in every quarter, although during the year there were equal number of control and experimental sections. Each quarter, the sections were designated as control or experimental prior to the first meeting of the classes; hence, there was no prior

knowledge of which students were in which sections.

The sections were assigned to four instructors such that if an instructor had an experimental section from the College of Business Administration, he also had a control section from that College. This was done during the same quarter if this was possible; if not, it was done as early as possible. The sections from the other two Colleges were assigned to instructors in this same manner. It was planned that each instructor would meet experimental and control sections from each of the three Colleges. This was approximated, but not fully attained. The assignment of the instructors to the sections is shown in Table I.

TABLE I

ASSIGNMENTS OF INSTRUCTORS EACH QUARTER TO SECTIONS IN VARIOUS COLLEGES

	Quarter							
	Winter		Spring		Summer		Fall	
College	Inst*	Sect**	Inst.	Sect.	Inst.	Sect.	Inst.	Sect.
Business Administration	S	C	S	C	G	C	S	C
	S	E	S	E	G	E	S	E
	J	E					M	E
Engineering	G	C			M	C	M	C
	G	E						
Home Economics							G	E
							S	C
							S	E
							J	C

* Initial of instructor
** C :: control section, E :: experimental section

In the sections from the College of Home Economics, the number of control sections was equal to the number of experimental sections. This was not possible for the sections from the other two Colleges because of conflicts in the schedules of the instructors.

Early each quarter, each student completed a data sheet upon which he indicated name, whether he was in an experimental or in a control section, sex, College within Drexel Institute of Technology, course or major, number of quarters he attended Drexel, age as of the first day of the quarter, lecture instructor, laboratory instructor, and previous and concurrent courses in biology and sociology. From available records there were added to each data sheet a score indicating verbal aptitude, and the scores made on the achievement examinations on General Psychology. A copy of the form is found in Appendix A.

During the next to the last week of each quarter, the students in the experimental sections anonymously completed a Student Opinion Schedule which permitted these students to express their opinions of the experimental method of teaching. A copy of the form is found in Appendix A.

Students in the experimental sections were told that they could see and hear what they missed because of absence, and that they could see and hear any of the materials they might request for the purpose of review. A record was maintained of the voluntary use of the materials.

Three examinations were constructed for use during the study. All items were of the multiple-choice variety. The first examination

contained 75 items which sampled the principles discussed in the first five chapters of the textbook, and related class discussion. The second examination also contained 75 items which covered the topics of the next six chapters. The final examination, containing 150 items, covered the work of the entire quarter.

During the Spring Quarter of 1959, trial items were used in the examinations administered to all of the students in General Psychology. Most of these items were selected from those supplied by the author through the publisher of the textbook and were assumed to possess content validity. An attempt was made to insure that all major aspects of the material were adequately covered by the test items and in the correct proportions. The number of tests given and the number of items per test were limited by the practical considerations of the length of the quarter and the length of the class period, respectively.

A count of the number of responses to each alternative of each item was made in order to obtain an evaluation of item difficulty and the appeal of the various distractors.

On the first examination, 34 of the items were retained intact. Nineteen of the items were altered only by the removal of a fifth alternative--the least appealing or the least plausible one--so that all items in the examination would have but four alternatives. In ten items, one or more of the distractors was changed to improve its appeal or plausibility, or to reduce ambiguity. Twelve new items were constructed to replace items which had no discriminating value at all or which were apparently

misunderstood by the respondents. An attempt was made to construct the new items to measure the understanding or knowledge of the principle or fact involved in the one being replaced.

The same procedure was followed with the second examination. Thirty-six items were retained unaltered, 13 items had one or more alternatives changed, and 26 new items were substituted.

A final examination containing 150 items, none duplicating those in the first two examinations, was administered to the students in General Psychology during the Summer Quarter of 1959. This examination was revised to reduce the number of alternatives per item to four by eliminating the least plausible or any ambiguous alternative.

CHAPTER IV

RESULTS

TEST RELIABILITY

Data on the reliability of the tests on General Psychology appear in Table II, and are based on 397 students who had taken all three of the tests. Separate scoring keys were applied to the odd-numbered items and to the even-numbered items on each answer sheet. For each test, the product-moment correlation for the group's odd-even scores was computed and the Spearman-Brown formula applied to obtain coefficients of reliability. Since the criterion of achievement used in this study was the sum of the scores made by each student on all three tests, this odd-even reliability was also computed.

The coefficient for the sums of the scores on the three tests was .90. It was concluded that the reliability of the criterion was acceptably high for the purpose of this study.

TABLE II

DATA ON THE ODD-EVEN RELIABILITY OF THE TESTS ON GENERAL PSYCHOLOGY

	N	Mean	S.D.	Odd-Even Relaibility uncorrected	corrected
Test 1					
Odds	397	23.95	4.01		
Evens	397	22.76	4.26	.62	.77
Test 2					
Odds	397	23.42	4.53		
Evens	397	20.51	5.07	.64	.78
Test 3					
Odds	397	46.14	7.32		
Evens	397	45.80	8.05	.75	.86
Total					
Odds	397	93.50	13.19		
Evens	397	89.06	14.72	.85	.92

ACHIEVEMENT IN CONTROL AND EXPERIMENTAL GROUPS

Comparison of Control and Experimental Teaching

There were eight independent variables, of which control was sought. These were as follows:

1. Age in months. At the beginning of each term, each student wrote on a data sheet his age in years and months as of the first day of the term. All ages were converted into months.

2. Sex.

3. College in which enrolled. On the data sheet, each student indicated either the College of Business Administration, the College of Engineering, or the College of Home Economics.

4. Course in which enrolled. The students were enrolled in these courses: Junior Secretarial, Commerce and Engineering,

Business Administration, Engineering, Basic Science, and Home Economics.

5. Previous and concurrent courses in biology and sociology. On the data sheet, each student wrote the name of the subject and the catalog number of each such subject. The number of credits for each course was obtained from the current catalog and for each student the sum of the credits was obtained.

6. Instructor. Each student wrote the name of his instructor on his data sheet.

7. Verbal aptitude score. When this study was planned, it was believed that the Scholastic Aptitude Test - Verbal score would be available for each student. It was discovered later that some students (those who had entered several years ago) had taken the American Council on Education Psychological Examination, 1949 Edition. On the assumption that the SAT-V score and the ACE Linguistic (L) score are comparable measures of verbal aptitude, the L percentiles were converted to the units used in the SAT-V. For each percentile, the value of t was obtained from a table of areas and ordinates of the normal curve of error, each value of t was multiplied by 100, and added algebraically to 500. The mean of the actual SAT-V scores was 479.25; the standard deviation was 83.65. The mean of the estimated SAT-V scores was 517.18; the standard deviation was 69.28. The difference between the means (37.93) divided by the standard error of the difference (7.68) was 4.9. It was concluded that the actual SAT-V scores differed significantly from the estimated SAT-V scores. In all further

analyses the data for students with actual SAT-V scores and the data for students with estimated SAT-V scores were treated separately.

8. Number of quarters at Drexel. Each student placed on his data sheet the number of quarters (including the present quarter) that he had attended. The time spent by some of the students in cooperative work programs was thus excluded. It was thought that it would be better to use the number of quarters attended rather than the class designation (freshman, sophomore, etc.) because some of the students were in two year programs, some in four year programs, and others in five year programs.

The dependent variable was the sum of the scores on three tests of achievement in General Psychology.

The analyses which follow were made in the Computing Center.

For those students who had actual SAT-V scores, the product-moment intercorrelations were found among the nine variables, comprising eight independent variables and the one dependent variable. On the basis of the null hypothesis that control and experimental sections did not differ significantly, these groups were combined in determining the intercorrelations. The intercorrelations are shown in Table III, and were based on 211 students. Coefficients reaching or exceeding .14 are significantly different from zero at the five per cent level of confidence.

A regression equation was then written in order to predict the sum of the scores on the three tests of achievement from the eight independent variables. The regression equation and the regression coefficients follow.

TABLE III

INTERCORRELATIONS OF EIGHT INDEPENDENT VARIABLES AND CRITERION OF ACHIEVEMENT BASED ON 211 STUDENTS WITH ACTUAL SAT-V SCORES

Variable Number	1	2	3	4	5	6	7	8	9
1									
2	.39								
3	-.37	-.76							
4	-.25	-.62	.66						
5	-.25	-.58	.61	.95					
6	-.03	-.01	.17	-.02	.06				
7	-.04	.02	.08	-.13	-.10	.08			
8	.45	.11	-.01	.06	.03	-.04	-.06		
9	.40	.76	-.80	-.72	-.68	.02	.06	.07	

1 :: achievement
2 :: age in months
3 :: sex
4 :: college
5 :: course
6 :: biology and sociology
7 :: instructor
8 :: actual SAT-V score
9 :: quarters attended

$$\text{Predicted Achievement} :: b_0 + b_1(\text{age}) + b_2(\text{sex}) + b_3(\text{college}) + b_4(\text{course}) + b_5(\text{biology and sociology}) + b_6(\text{instructor}) + b_7(\text{actual SAT-V}) + b_8(\text{number of quarters attended})$$

where

$b_0 :: 84.569251$

$b_1 ::$ .127523

$b_2 :: -2.224458$

$b_3 :: 3.810643$

$b_4 :: -1.857759$

$b_5 ::$ .128579

$b_6 :: -$ .094810

$b_7 ::$ .142166

$b_8 :: 1.844163$

The achievement of each student was predicted with this regression equation. An analysis of variance was then made for these predicted values. Since the predicted values were adjusted for the eight independent variables, the analysis of variance is equivalent to an analysis of covariance of the original data. The analysis of variance appears in Table IV.

TABLE IV

ANALYSIS OF VARIANCE BASED ON PREDICTED ACHIEVEMENT SCORES FOR 211 STUDENTS WITH ACTUAL SAT-V SCORES

	Degrees of Freedom	Sum of Squares	Variance
Methods	8	60180.225	7522.5281
Within Groups	202	111188.770	550.4395
Total	210	171369.000	816.0428

F :: 13.6664 5% point :: 1.98

It was concluded that since the obtained value of F exceeded the five per cent level there were significant differences remaining in the data. The coefficient of multiple correlation between the predicted achievement scores and the eight independent variables was .59.

Means and standard deviations for control sections, experimental sections, and totals for control and experimental sections appear in Table V.

The mean predicted achievement for 120 students in the control sections was 187.22; the mean for 91 students in the experimental sections was 182.42. The value of t was 2.07. With 209 degrees of freedom, the mean for the control students was higher than the mean for the experimental students with the significance of the difference falling between the 5 and 2 per cent levels.

TABLE V

MEANS AND STANDARD DEVIATIONS OF PREDICTED ACHIEVEMENT SCORES FOR CONTROL, EXPERIMENTAL, AND TOTALS FOR CONTROL AND EXPERIMENTAL GROUPS, SAT-V SCORE ACTUAL

Section	N	Mean	S. D.
Control Sections			
1	4	194.15	18.41
2	18	198.51	15.11
3	12	189.20	13.34
4	8	191.69	11.73
5	11	191.04	6.31
6	10	197.19	12.19
7	19	170.23	11.33
8	18	169.28	10.89
9	20	197.92	12.61
Total	120	187.22	17.28
Experimental Sections			
51	11	198.56	11.35
52	6	174.65	21.15
53	10	196.85	12.59
54	7	179.45	10.55
55	6	191.10	10.37
56	5	189.58	13.77
57	20	171.89	8.45
58	14	171.18	8.66
59	12	184.54	11.53
Total	91	182.42	15.65

However, it should be noted that the difference between the two means was small, 4.80.

A similar analysis was then made for the students for whom the SAT-V scores had been estimated from their ACE-L percentile. The intercorrelations among the nine variables appear in Table VI. Control and experimental sections were combined in determining the intercorrelations.

TABLE VI

INTERCORRELATIONS OF EIGHT INDEPENDENT VARIABLES AND CRITERION OF ACHIEVEMENT BASED ON 186 STUDENTS WITH ESTIMATED SAT-V SCORES

Variable Number	1	2	3	4	5	6	7	8	9
1									
2	.15								
3	-.25	-.57							
4	-.19	-.25	.51						
5	-.08	-.12	.28	.91					
6	.12	.04	-.07	-.23	-.06				
7	-.06	-.07	.12	-.05	.03	.30			
8	.36	-.04	-.03	-.02	.02	.05	-.16		
9	.26	.50	-.75	-.47	-.27	.07	-.01	.03	

1 :: achievement
2 :: age in months
3 :: sex
4 :: college
5 :: course
6 :: biology and sociology
7 :: instructor
8 :: estimated SAT-V score
9 :: quarters attended

A regression equation was then written in order to predict the sum of the three scores on the achievement tests. The equation was in the same form as that found on page 18, except for the regression coefficients which were as follows:

b_0 :: 106.817160

b_1 :: .017763

b_2 :: - .340114

b_3 :: - 10.376925

b_4 :: 4.723933

b_5 :: .214872

b_6 :: - .266975

b_7 :: .120778

b_8 :: .969527

The achievement of each student was then predicted from this regression equation and these predicted scores were then subjected to an analysis of variance. The analysis is shown in Table VII.

TABLE VII

ANALYSIS OF VARIANCE BASED ON PREDICTED ACHIEVEMENT SCORES FOR 186 STUDENTS WITH ESTIMATED SAT-V SCORES

	Degrees of Freedom	Sum of Squares	Variance
Methods	8	24038.597	3004.82460
Within Groups	177	87061.403	491.87233
Total	185	111100.000	600.54054
	F :: 6.10895	5% point :: 1.99	

The obtained value of F exceeded the value for the five per cent level of confidence; it was concluded that significant differences remain in the data. The coefficient of multiple correlation between the predicted achievement scores and the eight independent variables was .47.

Means and standard deviations for control sections, experimental sections, and totals for control and experimental sections appear in Table VIII.

TABLE VIII

MEANS AND STANDARD DEVIATIONS OF PREDICTED ACHIEVEMENT SCORES FOR CONTROL, EXPERIMENTAL, AND TOTALS FOR CONTROL AND EXPERIMENTAL GROUPS, SAT-V SCORE ESTIMATED

Section	N	Mean	S. D.
Control Sections			
1	13	180.10	11.57
2	8	186.58	7.52
3	16	179.81	10.92
4	11	174.45	7.32
5	13	186.80	11.15
6	12	186.58	6.45
7	4	172.44	9.23
8	0		
9	13	177.54	7.35
Total	90	181.06	10.46
Experimental Sections			
51	11	186.80	11.40
52	15	167.11	10.58
53	11	181.05	7.36
54	20	176.59	12.13
55	6	184.44	5.39
56	13	183.50	6.73
57	5	178.08	10.81
58	7	164.54	7.66
59	8	182.92	7.12
Total	96	177.94	11.95

The mean predicted achievement for 90 students in the control sections was 181.06; the mean for 96 students in the experimental sections was 177.94. The value of t was 1.88, which, with 184

degrees of freedom, was not significant at the 5 per cent level of confidence.

The mean for the students in the control sections was slightly larger than the mean for the students in the experimental sections. While the difference is not significant, the direction of the difference is the same as that found for students who had actual SAT-V scores.

It is concluded that achievement in sections taught by conventional methods may be somewhat higher than achievement in sections taught by tape recorded lectures illustrated by posters, and discussion.

Factors Related to Achievement

In Table III appear the coefficients of correlation between achievement and each of eight other variables. This table was based on 211 students with actual SAT-V scores. For an N of 211, a correlation coefficient must reach or exceed .14 to be significant at the 5 per cent level of confidence.

Age in months was significantly related to achievement such that older students tended to achieve higher.

Sex was significantly related to achievement, with males achieving higher than females.

Students in the College of Engineering and in the College of Business Administration achieved higher than did the students in the College of Home Economics. Related to this was the finding that students in engineering and business administration courses

achieved higher than students in home economics courses; the coefficient between college and course was .95.

The number of credits in previous and concurrent courses in biology and sociology was not significantly related to achievement. Apparently the instructor did not affect achievement differentially.

Both the actual SAT-V score and the number of quarters attended were significantly related to achievement.

Table VI presents the correlation coefficients between achievement and the same eight other variables, but it was based on students with estimated SAT-V scores. For an N of 186, the coefficient must reach or exceed .14 to reach significance at the 5 per cent level of confidence. Achievement was related significantly to age, sex, college, estimated SAT-V score, and number of quarters attended. Older students, males, students in business administration and engineering rather than in home economics, those higher in verbal aptitude, and those who had attended a greater number of quarters tended to make higher achievement scores.

There was one factor related to achievement which was significant in the group having actual SAT-V scores and not significant in the group having estimated SAT-V scores. This was the tendency for those pursuing courses in engineering and in business administration to achieve higher than those pursuing courses in home economics.

Based upon all students in the study, higher achievement was found in those students who were older, male, in the College of Engineering and the College of Business Administration rather

than in the College of Home Economics, higher in verbal aptitude, and in college for greater numbers of quarters.

Factors Related to Effectiveness of Method of Instruction

Some further comparisons were made to determine if in certain groups of students the achievement in the experimental sections differed significantly from that of students in control sections. One comparison was that of the achievement of males to that of females. The data appear in Table IX. The difference between

TABLE IX

COMPARISONS OF ACHIEVEMENT OF MALES IN CONTROL SECTIONS TO MALES IN EXPERIMENTAL SECTIONS, AND OF FEMALES IN CONTROL SECTIONS TO FEMALES IN EXPERIMENTAL SECTIONS

Section	Male	Female
Control Sections		
Mean	190.65	172.22
S. D.	24.60	29.12
N	132	53
Experimental Sections		
Mean	185.60	172.38
S. D.	24.63	26.48
N	99	88
Difference between means	5.05	.16
S. E.	3.19	4.69
t	1.58	.03

means was not significant at the five per cent level of confidence. It was concluded that sex was not related to the effectiveness of the method of instruction.

Another comparison was that of the achievement of students enrolled in the College of Business Administration in control sections to the achievement of students in that college but in experimental sections. The data appear in Table X. The difference

TABLE X

COMPARISON OF ACHIEVEMENT OF STUDENTS IN THE COLLEGE OF BUSINESS ADMINISTRATION IN CONTROL SECTIONS TO THAT OF SUCH STUDENTS IN EXPERIMENTAL SECTIONS

	Control	Experimental
Mean	187.21	181.81
S. D.	24.16	25.27
N	81	105
Difference between means	5.40	
S. E.	3.39	
t	1.46	

between means was not significant. Neither method of instruction was superior to the other among students in the College of Business Administration.

In a similar manner, the achievement of students in the College of Engineering and in control sections was compared to the achievement of students in that College but in experimental sections. The data are presented in Table XI. The difference between means was not significant. Neither method of instruction was superior to the other among students in the College of Engineering.

For the College of Home Economics a comparison was made of the achievement of students in control sections to that of students in

experimental sections. The data appear in Table XII. The difference between means was not significant. Neither method of instruction was superior to the other.

TABLE XI

COMPARISON OF ACHIEVEMENT OF STUDENTS IN THE COLLEGE OF ENGINEERING IN CONTROL SECTIONS TO THAT OF SUCH STUDENTS IN EXPERIMENTAL SECTIONS

	Control		Experimental
Mean	195.46		188.09
S. D.	26.26		27.46
N	78		22
Difference between means		7.37	
S. E.		6.47	
t		1.14	

TABLE XII

COMPARISON OF ACHIEVEMENT OF STUDENTS IN THE COLLEGE OF HOME ECONOMICS IN CONTROL SECTIONS TO THAT OF SUCH STUDENTS IN EXPERIMENTAL SECTIONS

	Control		Experimental
Mean	167.80		171.92
S. D.	24.58		26.27
N	51		60
Difference between means		4.12	
S. E.		4.90	
t		.84	

TABLE XIII

COMPARISON OF ACHIEVEMENT OF STUDENTS IN CONTROL SECTIONS TO THAT OF STUDENTS IN EXPERIMENTAL SECTIONS WHEN STUDENTS ARE SEGREGATED BY COURSE PURSUED

Course and Section	N	Mean	S. D.
Business Administration			
Control sections	75	186.79	22.83
Experimental sections	82	184.93	23.03
Engineering			
Control sections	72	195.17	26.72
Experimental sections	20	187.65	27.32
Home Economics			
Control sections	45	163.40	24.27
Experimental sections	57	171.19	24.74

None of the differences between means from control and experimental section within a given course is significant at the 5 per cent level.

The data for the students were next separated according to the curriculum or course pursued. The data for business administration in this comparison included only those data for students in business administration courses; it excluded students in commerce and engineering, and students in the junior secretarial course. (The numbers of students in these last two named courses were too small to include in comparisons.) The data for students in engineering courses excluded students who majored in mathematics, physics, or chemistry. (Again, the numbers of students in these last three named courses were too small to make comparisons.) The data for students in home economics courses excluded a small number of students who were majors in biological science.

For the students in these three courses, comparisons of achievement of students in control sections to that of students in experimental sections appear in Table XIII. In no course did achievement in control sections differ significantly from achievement in experimental sections.

The data were then separated on the basis of the instructor meeting the group. While for all four instructors the mean achievement of control sections was higher than the mean achievement of experimental sections, none of the differences between control and experimental sections was significant. Differences among instructors were consistent with the nature of the sections they met.

In summary, no significant differences were found between the mean of the achievement scores for students in control and experimental sections when the students were segregated on the basis of sex, the College in which enrolled, the curriculum or course pursued, or the instructor.

STUDENT ACCEPTANCE OF THE EXPERIMENTAL METHOD

A copy of the Student Opinion Schedule appears in Appendix A. This was completed by the students in the experimental sections during the next to the last week of the quarter.

The first question asked the student to estimate how well he had learned through tape recorded lectures and discussion. The results appear in Table XIV. Only 26.4 per cent indicated that they thought they had learned about the same, a little more, or much more as they might have with conventional instruction;

73.6 per cent thought they learned less. It is of interest to compare these data with similar data for television teaching presented by Carpenter and Greenhill. 6/ At the end of a televised course in General Psychology, 3 per cent said they learned much more, 11 per cent a little more, and 43 per cent about the same. Hence, it was concluded that a total of 57 per cent had favorable attitudes toward televised instruction. Favorable attitudes toward tape recorded lectures and discussion obviously occurred less frequently.

The second question requested the student to judge whether the course taught by the experimental method was more or less interesting than it would have been if taught by conventional methods and procedures. The results are shown in Table XV. Only 20.4 per cent thought the interest to be about the same or more. Again a comparison can be made to similar data regarding televised instruction. Carpenter and Greenhill found that at the end of a televised course in General Psychology 6 per cent thought the televised course much more interesting, 20 per cent a little more, and 22 per cent about the same. 7/ Thus the per cent of students finding tape recorded lectures and discussion as interesting or more interesting than conventional instruction was less than half of the per cent of students considering televised instruction as interesting or more interesting than conventional instruction.

6/ Carpenter, C. R. & Greenhill, L. P., Project Number One, op. cit., Table 5, p. 48.

7/ Ibid., Table 6, p. 49.

TABLE XIV

STUDENT ESTIMATES OF LEARNING THROUGH TAPE RECORDED LECTURES AND DISCUSSION COMPARED TO CONVENTIONAL INSTRUCTION

	Number	Per Cent
much more	4	2.2
a little more	25	13.4
about the same	20	10.8
a little less	80	43.0
much less	57	30.6
Total	186	100.0

TABLE XV

STUDENT ESTIMATE OF INTEREST IN COURSE PRESENTED BY TAPE RECORDED LECTURES AND DISCUSSION COMPARED TO CONVENTIONAL INSTRUCTION

	Number	Per Cent
much more interesting	6	3.2
a little more interesting	10	5.4
about the same	22	11.8
a little less interesting	53	28.5
much less interesting	95	51.1
Total	186	100.0

TABLE XVI

STUDENT ESTIMATE OF DEGREE TO WHICH THEY MISSED NOT BEING ABLE TO PARTICIPATE IN CLASS DISCUSSIONS OR TO ASK QUESTIONS DURING LISTENING PERIODS

	Number	Per Cent
a great deal	82	44.1
a little	75	40.3
not at all	29	15.6
Total	186	100.0

TABLE XVII

STUDENT AGREEMENT WITH STATEMENT THAT WHEN LISTENING TO TAPE RECORDED LECTURES AND VIEWING POSTERS THERE ARE FEWER DISTRACTIONS THAN IN CONVENTIONAL INSTRUCTION AND YOU CAN CONCENTRATE BETTER

	Number	Per Cent
agree strongly	11	5.9
agree somewhat	43	23.1
disagree somewhat	56	30.1
disagree strongly	69	37.1
have no opinion	7	3.8
Total	186	100.0

The third question asked the students to list the advantages and disadvantages of tape recorded instruction. This will be discussed later, along with other comments by students.

The fourth question asked how much the student missed not being able to participate in class discussions or ask questions during the listening period. As indicated in Table XVI, 84.4 per cent regretted the inability to participate and ask questions; only 15.6 per cent did not miss these.

In the fifth question, it was suggested that when listening to tape recordings and viewing posters there are fewer distractions than in conventional instruction. The student was asked to indicate a degree of agreement with this suggestion. The results are presented in Table XVII. Only 29 per cent agreed somewhat or strongly.

The sixth question asked the student how well he felt he knew his instructor in Psychology as compared to instructors in other subjects. Over half of the students, actually 60.2 per cent, felt that they knew the instructor in Psychology about as well or better than instructors in other subjects. The data appear in Table XVIII.

The seventh question asked the student if he would enroll in another college course which used this method of instruction (i.e., with tape recorded lectures and discussion). The results appear in Table XIX. A negative reply was received from 60.8 per cent. Only 14.5 per cent replied positively; 24.7 per cent were undecided.

The eighth question asked if the discussions with the instructor added anything appreciable to the learning in the course. As seen

in Table XX, 77.4 per cent answered affirmatively. A substantial majority of the students felt that the discussions were of value.

TABLE XVIII

STUDENT RESPONSES TO QUESTION "DO YOU FEEL THAT YOU KNOW YOUR INSTRUCTOR IN THIS COURSE AS WELL AS YOU KNOW YOUR OTHER INSTRUCTORS WHOM YOU HAVE HAD FOR AN EQUAL TIME?"

	Number	Per Cent
not as well	74	39.8
about as well	99	53.2
better	13	7.0
Total	186	100.0

TABLE XIX

STUDENT RESPONSES TO QUESTION "DO YOU FEEL THAT YOU WOULD ENROLL FOR ANOTHER COLLEGE COURSE THAT USED THIS METHOD OF INSTRUCTION?"

	Number	Per Cent
yes	27	14.5
no	113	60.8
undecided	46	24.7
Total	186	100.0

TABLE IX

STUDENT RESPONSES TO QUESTION "DO YOU FEEL THAT THE DISCUSSIONS WITH TCH INSTRUCTOR ADDED ANYTHING APPRECIABLE TO YOUR LEARNING IN THE COURSE?"

	Number	Per Cent
yes	144	77.4
no	21	11.3
undecided	21	11.3
Total	186	100.0

The sixth question was a request for general comments regarding the course. The comments will be discussed below, along with other comments.

Invited to do so, practically all the students wrote in reasons for the answers they checked. Two questions did not require any checking of an answer, but requested comment.

It was thought that the comments from the students provided a greater understanding of their varied reactions than did the percentages reported in the tables. For each question, comments are grouped under each answer checked. An attempt was made to include all comments with different meanings. It was apparent that in a few cases one student obtained comments from another student, since the comments were literally identical. In such a case, the comment was not repeated. Since considerable judgment is needed in deciding if two comments in different words possess

the same meaning, the analysis of the comments was checked by the associate investigator. The sample of the comments follows.

The first question was "Do you think you are learning as much from tape recordings as you would have learned in a conventionally taught course with the same instructor?"

Those answering "much more" made these comments:

> no distractions, no interruptions
> you have to be alert to copy the cards--a good study guide
> more complete notes, chapters made clearer

Those indicating "a little more" gave as reasons:

> tapes require more thorough study of the book
> tape recorder a challenge, applied myself more
> controlled organization of material
> more responsibility on student
> not enough time to write and listen
> questions can be asked in discussion periods
> only important things are presented on tape
> amount of material covered is greater
> lecture does not digress
> notes are on visual aids--can write them correctly

"About the same" was checked for these reasons:

> I rely on the book--taped lecture doesn't matter
> speed uninterrupted, dull, sleep-provoking
> instructor explains each chapter
> important topics are not emphasized as much
> material is the same as conventionally presented
> course depends upon willingness of student to learn
> lecture on tape cover same material as "live" lectures
> In live lectures instructor may dwell too long on one point.

Those answering "a little less" said:

> less first hand experience with instructor
> important points not emphasized
> difficult to listen and write
> comments, answers to questions are missed
> too fast; suggest giving out mimeographed notes
> mind wanders, hard to pay attention
> interest not stimulated
> poor speakers; poor technical quality

less interesting
voices are monotonous
delay in answering questions
does not follow book exactly
tape is merely a rapid outline
can't detect what is important from tape
human approach is lost

"much less" was checked for these reasons:

tapes thoroughly boring
dull, no high lights
taped lecture cheats the student
tapes do not motivate the student
too busy writing to listen to tape
questions should be answered when fresh in mind
too impersonal
tape does not hold attention
too little participation by students
no chance to learn from fellow students
tapes do not hold attention
in discussion period there are no intelligent questions
hard to adjust to tapes
tapes go too fast to take notes
no time to digest ideas

The second question was "Do you think the course is more or less interesting than it would have been as taught by conventional methods and procedures:"

Those checking "much more interesting" commented:

interesting discussions
course more interesting, wider point of view
three different lecturers, talks very complete
precise, easy to understand; discussion clarifies

"A little more interesting" was checked for these reasons:

it provides a break from methods in other courses
only because of cases and actual situations presented
enjoyed the discussion which made up for lack of conversation in the regular hours
lectures with cards kept the topics moving
rather novel and a new experience
variety of instructors presenting different views

Those answering "about the same" gave these reasons:

we do have two periods to ask questions

tape and live instructor say about the same thing
presented in the best possible way
I have to work harder to learn the material
the material is interesting; method of presentation
does not matter
interest varies with topics and instructors
a course is not interesting merely because of method
of instruction
visual aids are informative
discussions supplement the course

Those answering "a little less interesting" said:

not enough examples
instructors not interesting
little time for discussion
action, comment, questions missing
dull, monotonous
lab work would be more interesting
little expression in voice
a "live" teacher can project attitudes better
speech sometimes too fast
cold, impersonal
interest drops when you do not fully understand
questions can not be asked at time of interest

"Much less interesting" was checked for these reasons:

missed personal appearance of instructor
impossible to ask question at the time
note taking lags behind the tape
uninteresting, lack of feeling
because we do not have experiments
too impersonal, mechanical
almost impossible to be attentive
no rapport with students
lack of facial expression; can argue freely
no jokes or mistakes from lecturer

The third question was "From your point of view, please compare tape recorded and conventional instruction."

The following were stated as "principal advantages of tape recordings":

you cover exactly what the tape wants you to
got material across without delay--no questions
in case of absence, lecture can be heard

information better organized
more material covered
lecture can be heard more than once
classroom quieter; same instruction for all classes
posters give logical outline of important topics
useful when there is a shortage of teachers
enables constant improvement of lectures as teachers see fit
no interruptions
lectures are better organized
clearness of notes
doesn't wander
saves time and money
some actual cases can be presented
eliminates dealing with student problems
variety of instructors

The "principal disadvantages" listed were:

no class participation
interest is not maintained
the voice and speed of voice of the person making the tape
inability to listen and write what is on cards
more monotonous, less personal
unable to ask immediate questions
you don't know what is or isn't important
waiting to ask questions causes them to be forgotten
no real personal contact
poor acoustics in room
must concentrate more on copying cards than on listening
no contact with instructor; too mechanical, boring
absence of emotion of speaker
no gestures or facial expressions
lectures are too complete
no lab situation to apply knowledge
too little variety in presentation
can't regulate speed according to class
poor quality of tapes

The fourth question was "In your opinion, during listening periods, how much do you miss not being able to participate in class discussions or ask questions?"

Those checking "a great deal" commented:

rushed to keep up with tape
discussion would stimulate interest
by time of discussion questions are forgotten

absence of instructor's opinions and answers
recordings sever reciprocity of student-teacher relationship
it is difficult to refer to a specific part of a tape
recitation is a principal asset to learning
participation in discussion promotes attentiveness
can't learn from fellow students
lack of instructor's opinions
day dreaming occurs

"A little" was checked for these reasons:

missed spontaneous reactions of students and teacher
it depends on what you don't understand
questions bother me but there is no time for answers
discussion might not center on important topics
questions are answered later; questions during the lecture might be unintelligent
questions can emphasize personal difficulties of students
teacher can make things clearer by answering questions at the time of trouble
not being able to keep up with tapes and cards
discussions might get off topic
don't hear other's views on subject

Those answering "not at all" said:

questions are answered eventually
I rely more on the book
participation is no major factor in learning
questions may be noted and have been well covered in lab period
I'd rather listen than contribute something which might not be helpful
because it can be discussed the next hour
does not seem to be a "discussion" course
most people ask questions which waste the class time
people don't ask questions anyway
tape usually answers questions

The fifth item began "It may be that when listening to tape recordings and viewing posters there are fewer distractions than in conventional instruction and you can concentrate better on what is being taught. Do you . . ." This was to be completed by checking "agree strongly," "agree somewhat," "disagree somewhat," "disagree strongly,"

or "have no opinion".

Those checking "agree strongly" commented:

if one wishes to concentrate
depends on instructor and subject taught
if only the speaker would talk more slowly we could grasp everything
in conventional instruction discussion breaks train of thought

Those indicating "agree somewhat" said:

in class I feel tense--another rat race with the tape; leaving class I feel washed out
fewer distractions but minds wander
would be better not to have posters; we'd have to listen then
however, a person who persists in making a noise with a candy wrapper can be annoying
posters are a help, but distract
student knows professor but professor does not know student
you can concentrate more, but can not learn well

Those checking "disagree somewhat" indicated:

distractions are the same
tape teaching floods the mind with unimportant material
can't concentrate on cards and listen at the same time
time is lost taking notes
posters are a distraction
posters give an outline; would be better mimeographed
posters too long
less movement to hold attention
if instructor is interesting, he can hold attention better

"Disagree strongly" was checked with these comments:

spend all the time writing, not listening
recording creates better conditions for distraction
more distration; suggest projecting posters in a dark room
completely dependent upon the individual
idle hands are the devil's workshop
would be better if talking and drawings were simultaneous
near the end there was a constant rustle in the room
material is so dry and boring that my mind begins to wander
a good instructor can much more effectively hold a student's attention
tendency to day dream
a live teacher creates a mood, which holds attention

No one checked "have no opinion".

The sixth question was "Do you feel that you know your instructor in the course about as well as you know your other instructors whom you have had for an equal time?"

Those checking "not as well" made these comments:

facial expression helps one to know instructor
no personal contact, no interest in student
evaluating instructor's ideas is limited
less intimacy in recorded lecture
he only teaches the course half the time
on the tapes, one hears a variety of instructors speaking
little time to evaluate personality
discussions only twice a week
less expression of personal opinion

"About the same" was the answer for these reasons:

two hours per week for discussion
I know instructor as well as in any other course
instructors other than discussion leader lecture
opportunity for discussion out of class
he has held interesting discussions
ample time for questions
about as well as a person, but not as an instructor

Those answering "better" said:

mainly due to the attitude of the instructor
if none of her personality was revealed, I would feel cheated
only half as much contact, but contact is effective
emphasis upon informality during the discussion helps
during discussion periods, the instructor is more apt to deviate from the subject matter
by hearing the tapes made by various instructors, we could compare our instructors ideas with those of two other teachers

The seventh question was "Do you feel that you would enroll for another college course that used this method of instruction?"

Those answering "yes" said:

in any course where the visual is not important
I did soak up knowledge
I have to find answers rather than ask
if the course were refined and certain aspects emphasized more, I would certainly enroll for another
I prefer it
I see no detriment to the student in courses which are normally lecture courses
complete lectures, easy to get notes
less variation from class to class due to individual instructors presenting the material differently
other than technical subjects
I enjoyed it
interesting and I got a lot out of it
charts organized the lecture
more material can be presented
if the method could be perfected, with half period tape, half discussion
I feel I have benefited by this course
its good points outweigh the bad
increased coverage of lecture material
OK for subjects dealing with facts, but not for abstract subjects

Those answering "yes" were asked "what subject?" In many cases, no subjects were indicated. However, six students suggested sociology, three economics, two mentioned economics, management, and history. Mentioned just once were human relations, business administration, engineering, health, labor relations, psychology, humanities, political science, biology, and any social science.

Those answering "no" made these comments:

prefer personal appearance lectures
not as interesting
the content of the course I got from the textbook
just one step toward mechanization of teaching
detracts from subject; a waste of fees
tapes are boring, dull, no help, uninformative
cannot adjust to course taught this way
I think I got more out of the class discussions
puts me to sleep too much
I have not found it satisfactory in this course
to think of deliberately choosing another term of that jazz would be pure idiocy

a poor method of instruction; I was not getting my money's worth
taped lectures and discussion need to be more closely integrated
I cannot concentrate as well
for a variation it is fine, but to take all subjects this way would be a waste of time; better to outline book and study that
I came and paid to learn in the best possible way, not to be experimented with

Those checking "undecided" said:

it would depend on the specific course
I learn nothing in class, study more at home
prefer more discussion and smaller groups
I am unsure I would do as well as in a regular course
this method is good for courses like this, but it would not work as well for something like economics
I did not like it, but would be willing to try it a second time
perhaps with more exposure this would be a better method of instruction
I might enroll for a lecture course where questions were not allowed
in other courses maybe more figures or problems would have to be shown
it would depend upon how perfected they've become in their lectures

The eighth question asked "Do you feel that the discussion with your instructor added anything appreciable to your learning in the course?"

Students answering "yes" gave these reasons:

personal contact
instructor presented practical applications
what limited discussion we had was good
questions are answered
topics neglected or lightly touched upon in lecture could be discussed in class
discussion clarified matters
presented different and better examples than on tape or in book
learned a good deal more from discussion than from tape
discussion gives the course the "life" which the tape lack
discussion made this course as meaningful as it is

he stressed things he thought important; this is hard for the beginning student to do

Those checking "no" said:

too much time "shooting the bull"
I rely more on book than lectures
only a few questions were pertinent
questions forgotten; answers dulled by recording
lapse of time between the tape and the discussion was a definite drawback
discussion periods were not organized
not enough discussion

Those who were "undecided" commented:

discussion extremely interesting, but did not cover what would be asked in tests
discussion a bright spot in an otherwise boring course
material not fresh in mind made discussion difficult
got little from tape; discussion didn't mean much
major objections are speed of factual material and very little else resembling teacher-student atmosphere
might have learned more doing experiments
it is hard to tell since you can't compare what you have learned with what you might have learned.

The final item in the Student Opinion Schedule was "General comments regarding the course will be appreciated." Representative comments follow.

hand out printed notes
give students an outline to be completed
instructor would sound better in person
a good process to have on reserve in library
have shorter tapes and immediate discussion
students get too little contact with instructors as it is
I am in sympathy with the method, feel more free, method is mature and relaxing
I need facial expression and body movement
majority of students lost interest; they should discontinue this tape recorded course
charts very helpful
first few tapes were interesting--novelty; boring thereafter
shoot your present lecturers, or jab a safety pin in them
an experience to see how mass education can be treated
has many possibilities, but we are not ready to accept them

like idea of tape; definitely helpful in future scarcity of teachers
could be improved by alternating lectures more frequently
does not stimulate interest in further psychology courses
discussions are not organized because the questions are not in any particular order
not conducive to college education
length of statements on posters is too great and too detailed
quite an enjoyable variation of the conventional college classroom, but more than one course of this type (at the same time) might have a negative effect
use a completely enclosed classroom
lectures paralleled the text; only the text was needed
the tapes will never make the hit parade
mechanical devices will never to any satisfactory degree replace the classical method of teaching; we are not paying tuition to be taught by such means
charts and graphs should be colorful; use pictures where applicable
the lectures were well prepared
instead of the charts, write the material on the blackboard
tapes held my attention better than a lecturer would, but I would not choose to take more than one subject a term taught in this fashion
an individual could listen to tapes and read at home; Drexel would not be necessary

This section may be summarized as follows.

Almost 75 per cent of the students thought that they learned less through tape recorded lectures and discussion than they would have learned through conventional instruction.

Approximately 80 per cent of the students thought that the experimental method of instruction was a little less or much less interesting than conventional instruction would have been.

About 85 per cent indicated that they disliked not being able to ask questions during the presentation of tape recorded lectures.

Only 29 per cent thought that there were fewer distractions and better concentration during tape recorded presentations than

in conventional instruction.

About 60 per cent of the students indicated that they felt they knew the instructor about as well or better than instructors in other subjects.

Approximately 60 per cent indicated that they would not enroll in another college course that used the experimental method of instruction. About 25 per cent were undecided.

Over 77 per cent felt that class discussion of the tape recorded lectures was of value.

Principal advantages of tape recordings stated by the students included: better organization, more material covered, lecture can be heard more than once, posters gave logical outline, variety of instructors, and saves time and money.

Principal disadvantages were lack of class participation, little interest, impersonal, voices poor and monotonous, poor acoustics in room, and poor recording.

General comments were numerous and quite varied.

VOLUNTARY LISTENING TO TAPE RECORDED LECTURES

Students in the experimental sections were told at the beginning of the quarter that they could listen to any tape they might have missed because of absence; or, the lectures could be heard again for review purposes.

During the year, 13 students spent a total of 26 hours in such voluntary listening. Of these 26 hours, 16 were used to listen to lectures for the first time because the scheduled lecture was missed.

Ten of the 26 hours were devoted to listening for the purpose of review.

One foreign student spent seven hours listening for review purposes. Three other students listened one hour each for this purpose.

Of the students listening voluntarily because they had missed the scheduled presentation, one student listened for four hours, three students listened for two hours each, and six students listened one hour each.

There were 187 students in the experimental sections; of these 13, or 7 per cent, listened to the tapes at times other than during the scheduled presentations. This per cent is surprisingly low. However, the experience may have been of considerable value to the students engaging in such listening. A possible reason for this low per cent is that few students were absent from class.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The following conclusions have been numbered to correspond to the objectives of the study, which were stated on page 3.

1. Achievement in sections taught by the conventional method (lecture, discussion, and laboratory exercises) tended to be somewhat greater than achievement in sections taught by tape recorded lectures illustrated by posters, and followed by discussion. Based on students for whom Scholastic Aptitude Test - Verbal scores were available, those taught by conventional methods achieved higher, and the difference was significant between the 5 and 2 per cent levels of confidence. Based on students for whom American Council on Education Psychological Examination - Linguistic scores were available, those taught by conventional methods achieved higher, but the difference was not statistically significant.

2. Based upon all students in the study, achievement tended to be higher in those students who were older, male, in the College of Engineering or in the College of Business Administration rather than in the College of Home Economics, higher in verbal aptitude, and in college for greater numbers of quarters.

3. No significant differences in achievement were found between students taught by conventional methods and those taught

through tape recorded lectures illustrated by posters and followed by discussion, when the students were segregated on the basis of each of the following variables: sex, college in which enrolled, course pursued, and instructor.

Regarding student acceptance of the experimental method of teaching, a majority thought that they learned less than they would have learned through conventional instruction; that it was less interesting; that they disliked not being able to ask questions; that they knew the instructor about as well as, or better than, instructors in other subjects; that they would not enroll in another course using the method; and that class discussions were of value.

Principal advantages of tape recorded lectures indicated by the students were: better organization, more material covered, lecture can be heard more than once, posters gave a logical outline, variety of instructors, and saves time and money.

Principal disadvantages stated were: lack of class participation, little interest, impersonal, voices poor and monotonous, poor acoustics in room, and poor recording.

4. Only 13, or 7 per cent, of the students listed to the tape recorded lectures at times other than during the scheduled presentations. These students spent a total of 26 hours in voluntary listening. Of these, 16 hours were used to listen to lectures for the first time because the scheduled presentation was missed. Use for this purpose was low.

5. One foreign student spent seven hours listening for purpose of review. Three other students listened one hour each for this purpose. The foreign student considered this opportunity of value. Use for review was low.

6. Those senior students who participated as student assistants enjoyed the work and felt that it increased their knowledge of Psychology. However, their busy schedules did not permit them to participate as much as they would have liked to. These student assistants did not experience discipline problems.

RECOMMENDATIONS

1. Since achievement tended to be slightly higher in sections taught by conventional methods, the continuation of this method is recommended. But should a severe shortage of instructors develop, teacher-student contact can be reduced by one-half in classes in General Psychology with only a small decrease in achievement as measured by tests.

2. Because the students opposed the use of tape recorded lectures illustrated by posters, and followed by discussion, the use of this method is not recommended except as a last resort.

3. Further study is recommended to determine if the experimental method of teaching would prove effective if the listening were scheduled at the convenience of the student.

4. Further study is recommended to determine if there would be value in supplementing the regular live lectures by

voluntary listening to tape recorded materials. This could be accomplished by piping the recorded materials to listening stations in the Library.

PRECEDING PAGE BLANK-NOT FILMED

BIBLIOGRAPHY

Carpenter, C. R. & Greenhill, L. P., Project Number One, An Investigation of Closed-Circuit Television for Teaching University Courses. University Park, Pa.: The Pennsylvania State University, 1955.

Carpenter, C. R. & Greenhill, L. P., Report Number Two, An Investigation of Closed-Circuit Television for Teaching University Courses. University Park, Pa.: The Pennsylvania State University, 1958.

Gibson, Mrs. Rodney E., "The Tape Recordings Experiment is Expanded in Westside Junior and Senior High Schools, Omaha, Nebraska," Bulletin of the National Association of Secondary School Principals, Vol. 43, No. 253, January, 1959, Pp. 49-72.

Morgan, Clifford T., Introduction to Psychology, New York; McGraw-Hill Book Company, 1956.

Pickrel, Glenn, Neidt, Charles, and Gibson, Romain, "Tape Recordings are Used to Teach Seventh Grade Students in Westside Junior-Senior High School, Omaha, Nebraska," Bulletin of the National Association of Secondary School Principals, Vol. 42, No. 234, January, 1958, Pp. 81-93.

PRECEDING PAGE BLANK-NOT FILMED

APPENDIX A

Forms Used — Page

Data Sheet 58

Student Opinion Schedule 59

DATA SHEET

DREXEL INSTITUTE OF TECHNOLOGY

RESEARCH PROJECT 24

Date_____ No._____
do not fill in

Name_____ Sex F M
Last First Initial (circle)

College_____

Course_____

Class_____

Age 1st day of quarter_____years_____months (to nearest month)

How many quarters have you attended Drexel, including this one?_____

Lecture Instructor_____Lab. Instructor_____

Previous or concurrent courses in	Biology	Sociology
	_____	_____
	_____	_____
	_____	_____

do not write below this line

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Student Opinion Schedule

As you know, we are interested in evaluating the use of the tape recorder as a tool for use in college instruction. An important consideration is the opinion of students taught this way. In order to provide a record of your opinion and to help us improve the course, you are asked to complete this questionnaire.

Please consider each question carefully and write your responses as fully and honestly as you can.

1. Do you think you are learning as much from tape recordings as you would have learned in a conventionally taught course with the same instructor?

_____ much more Why?

_____ a little more

_____ about the same

_____ a little less

_____ much less

2. Do you think the course is more or less interesting than it would have been as taught by conventional methods and procedures?

_____ much more interesting Why?

_____ a little more interesting

_____ about the same

_____ a little less interesting

_____ much less interesting

3. From your point of view, please compare tape recorded and conventional instruction:

Principal advantages of tape recordings

Principal disadvantages

4. In your opinion, during listening periods how much do you miss not being able to participate in class discussions or ask questions?

_____ a great deal Why?

_____ a little

_____ not at all

5. It may be that when listening to tape recordings and viewing posters there are fewer distractions than in conventional instruction and you can concentrate better on what is being taught. Do you:

_____ agree strongly

_____ agree somewhat

_____ disagree somewhat

_____ disagree strongly

_____ have no opinion

6. Do you feel that you know your instructor in the course about as well as you know your other instructors whom you have had for an equal time?

_____ not as well Why?

_____ about as well

_____ better

7. Do you feel that you would enroll for another college course that used this method of instruction?

_____ yes Why?

_____ no

_____ undecided

If "yes", what subjects?

8. Do you feel that the discussion with your instructor added anything appreciable to your learning in the course?

_____ yes Why?

_____ no

_____ undecided

9. General comments regarding the course will be appreciated.

APPENDIX B

Personnel of Drexel Institute of Technology Participating in the Study

Dr. James Creese, President (Ex officio)

James H. Robins, Director of Research

Emerson W. Conlon, Formerly Director of Research

George C. Galphin, Chairman, Department of Psychology and Education

Roland E. Johnston, Jr., Principal Investigator

Karl W. Geisinger, Associate Investigator

Emily J. Sherwood, Assistant Investigator

Michael Morello, Instructor in Psychology

Graphic Artists

Christine Griffith

Ann E. Amon

Darryl Klein

Barbara Wagner

Barbara Roberts

Student Assistants

Elizabeth Dwyer

Sara Schwartz

Director of the Computing Center

James B. Maginnis

Typist

Helen C. Reiner